



DGUS_SDK User Guide

(Ver4.9 2013.02)

Contents

1. DGUS_SDK_V4.9 Instruction	2
1.1 Operation of DGUS_SDK_V4.9.....	2
1.2 Main Interface of DGUS_SDK_V4.9.....	4
2. Main Functions of DGUS_SDK	7
2.1 Add Touch Buttons	8
2.1.1 Popup Window.....	8
2.1.2 Variable Data Input	9
2.1.3 Incremental Adjustment	11
2.1.4 Slider Adjustment.....	12
2.1.5 RTC.....	13
2.1.6 Touch Control.....	14
2.1.7 Return Key Code	15
2.1.8 ASCII Input.....	17
2.1.9 Firmware Parameter Settings.....	18
2.2 Add Variable Buttons.....	19
2.2.1 Variable Icon	19
2.2.2 Animation Icon	20
2.2.3 Slider.....	21
2.2.4 WordArt.....	22
2.2.5 Image Animation	23
2.2.6 Icon Rotation.....	24
2.2.7 Data Variable	25
2.2.8 Text Display.....	26
2.2.9 Digital RTC Display.....	27
2.2.10 Analog Clock Display	28
2.2.11 Dynamic Trend Curve	29
2.2.12 Table Display.....	30
2.2.13 Basic Graphic Display.....	32
2.2.14 Special Industrial Application.....	34
2.2.15 Bit Variable Icon.....	35
2.2.16 Timer Variable	37
3. Commands	38
3.1 Data Frame	38
3.2 Command Set	38
3.3 Register.....	39

1. DGUS SDK Instruction

1.1 Operation of DGUS SDK

1. DGUS (DWIN Graphical Utility Software) is an intelligent GUI design software for DWIN DGUS LCM with K600+. By using DGUS, magnificent display effect can be achieved easily and rapidly, with much less programming than ever before. Variables are defined by DGUS_SDK and users can feel free to design the visualize GUI. All parameters and images can be downloaded via SD card which stores related .bin files to make your design into real application.

2. Install DGUS SDK V4.9:

Unzip DGUS SDK V4.9.rar, and click DGUS ToolV4.9.exe to run it.

(.net Framework 2.0 is required to run the software).



3. VP (Variable Pointer): The addresses of variables in variable SRAM (56KB). Users can set buttons with defined VP, to change the value in this address and display contents corresponding with the value in VP address.

SP (Stack Pointer): the address of definitions, starting address of description data of variables. Change the value in particular address to modify variable properties. Take <WordArt> function as example.

Add.		Definition	Data Length	Description
0x00		0x5A03	2	
0x02		*SP	2	Stack pointer, default setting is 0xFFFF.
0x04		0x0007	2	The whole process length (in terms of words).
0x06	0x00	*VP	2	Variable pointer.
0x08	0x01	X,Y	4	Top-left coordinate of text, left aligned.
0x0C	0x03	Icon0	2	Icon ID corresponding to 0, the sequence is "0123456789-".
0x0E	0x04:H	Icon_Lib	1	Address of icon file.
0x0F	0x04:L	Icon_Mode	1	ICON display mode. 0x00: transparent, others: opaque.
0x10	0x05:H	Int_Num	1	Length of integer digits.
0x11	0x05:L	Dec_Num	1	Length of decimal digits.
0x12	0x06:H	VP_Data_Mode	1	0x00: integer (2 bytes), 0x01: long integer (4 bytes).

If SP is set at 0x5000 for WordArt variable.

VP parameter will be saved in 0x5000 address,

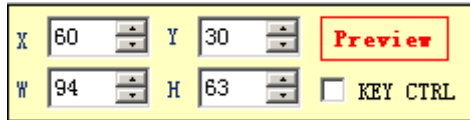
Variable position parameters will be saved in 0x5001-0x5002 address.

And so on.

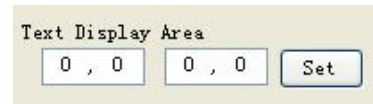
4. When you need to handle with icons, please copy icon files into <DWIN_SET> folder to operate them in DGUS_SDK_V49.

5. How to select area for buttons & variables.

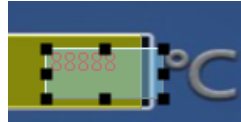
A. Input coordinates directly.



or



B. Drag the button/variable with mouse.



6. Define SP address for variables.

SP defines the description of variable settings; to reduce overlap of SP address is necessary. There is overlap judging embedded, Configuration files won't be created with failure message when it comes an overlap of SP address.

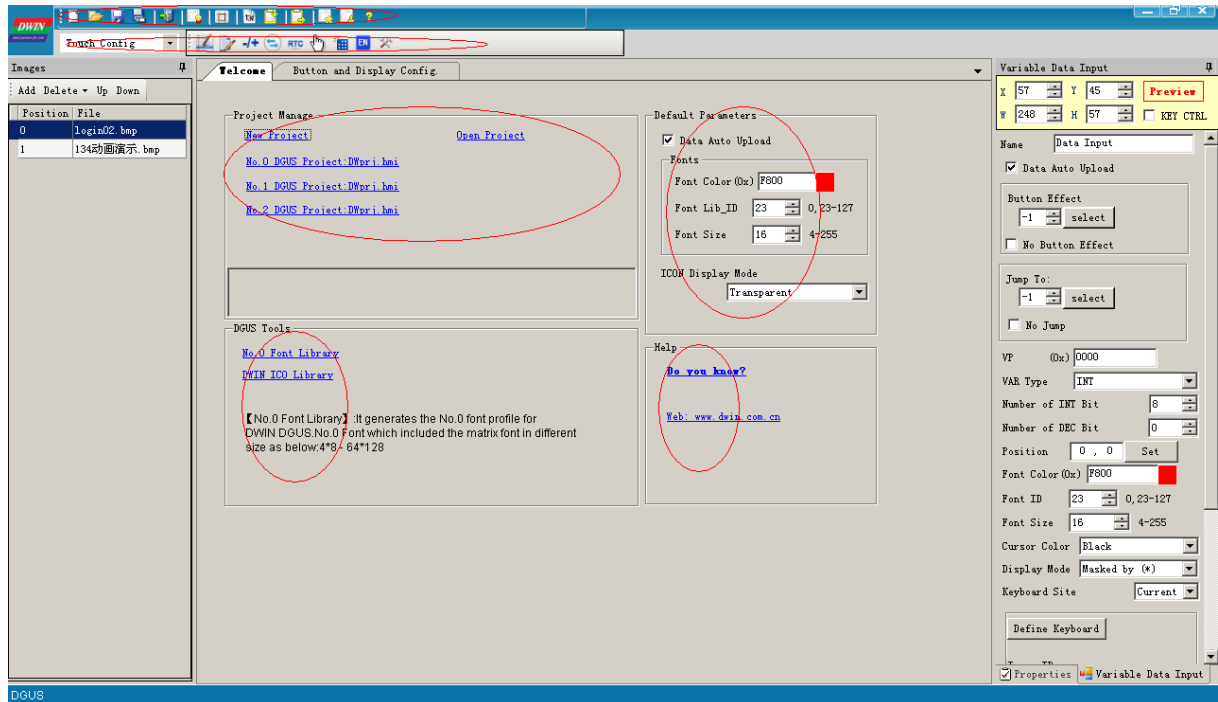


7. Import existing DGUS config. files into new project.

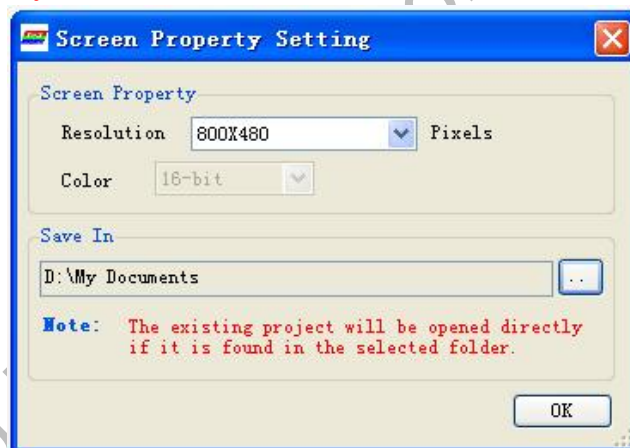
- Create a new project.
- Add pictures.
- Import config files.
- Copy icon files into <DWIN_SET> folder.

Note: Frame header is self-defined by users. In this document, A5 5A is taken as frame header for instance.

1.2 Main Interface of DGUS_SDK_V49



a) Click <New Project> to activate the window below:



b) Select resolution and path for your project.

Screen Property Set.

E.g. for:

DMT80480T070_06WT.

Color T: 16bit.

Resolution 80480: 800x480.

➤ Navigation Bar:

New: Create a new project.

Open: Open an existing project (.hmi file).

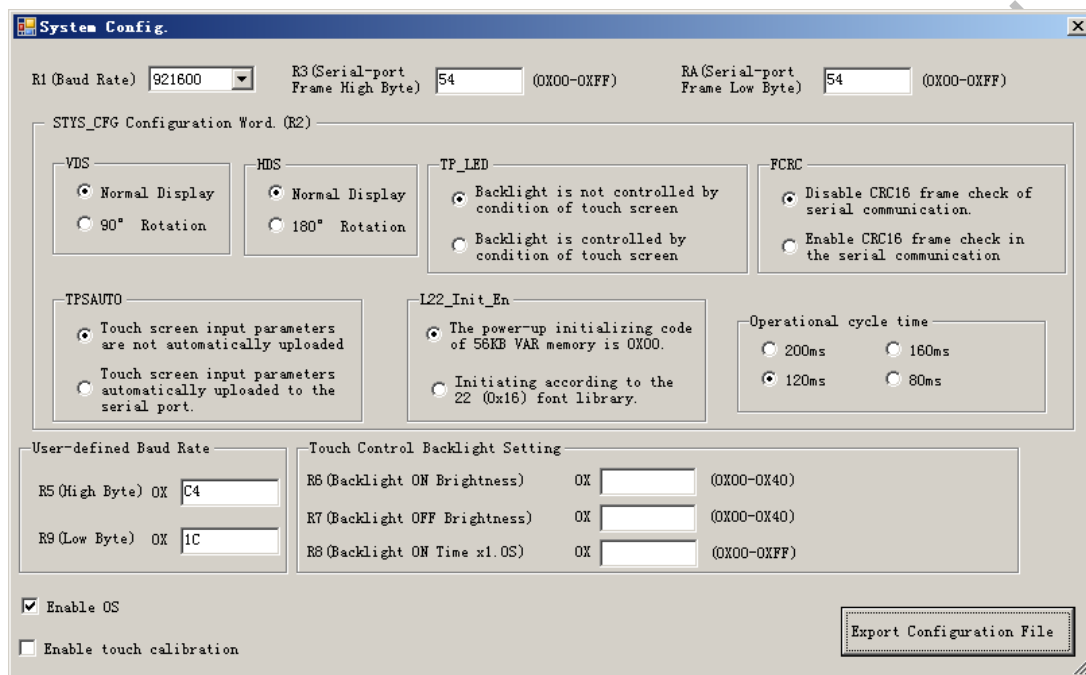
Save: Save the current project.

Save As: Save the current project in a new folder.

Close: Close the current project.

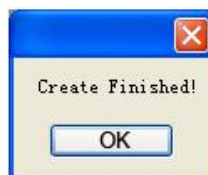
Resolution: Modify resolution of project.

System Properties: Modify system properties and save the settings in config.txt. Refer to illustration below:



Inputted data will be sent via serial port only when both <TPSAUTO> in System Config. Window and <Data Auto Upload> settings in buttons properties are ticked.

Create Config.: Generate <13Touch_Control_Config.bin> and <14Variable_Config.bin>.



Import Config.: Import existing config. files to the current project.

Variable Export: Generate <TouchConfig.xls> and <DisplayConfig.xls> for quick view of buttons & variables.

Align Left: Align the selected buttons and variables to left.

Align Top: Align the selected buttons and variables to right.

Auto Width: Adjust the selected buttons & variables at same width.

Auto Height: Adjust the selected buttons & variables at same height.

Copy (Ctrl + C): copy

Paste (Ctrl + V): paste

Delete (delete): delete

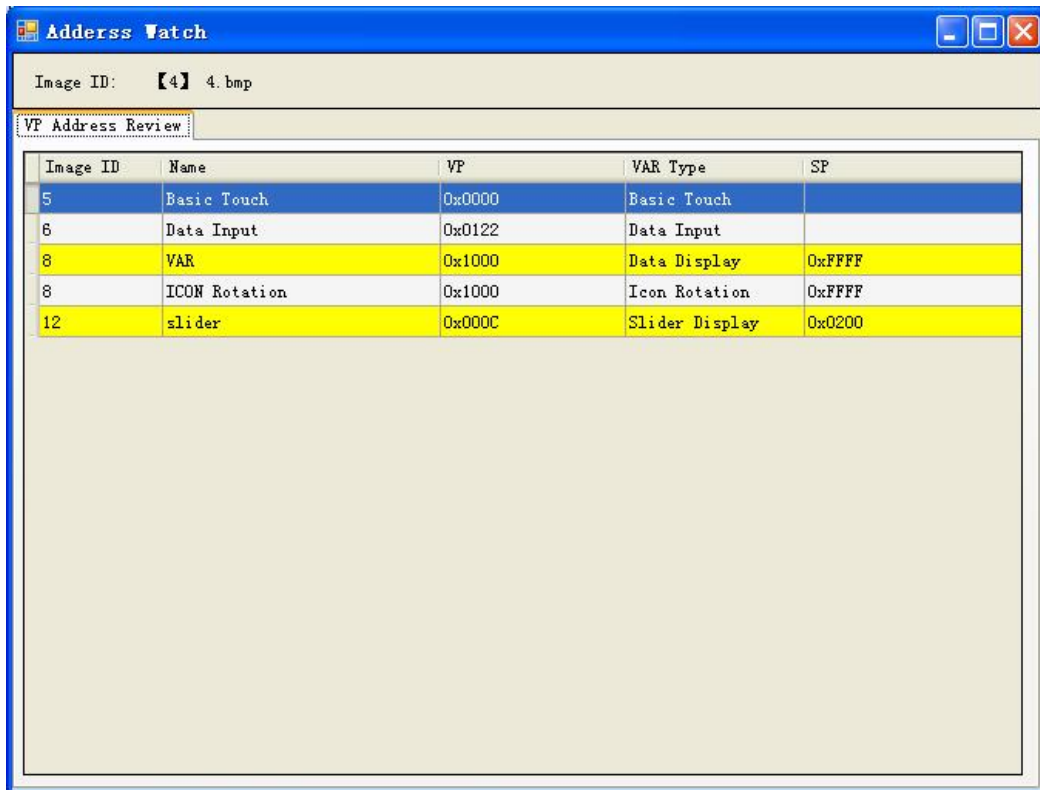
Front: Place the button or variable at front layer.

Back: Place the button or variable at backward layer.

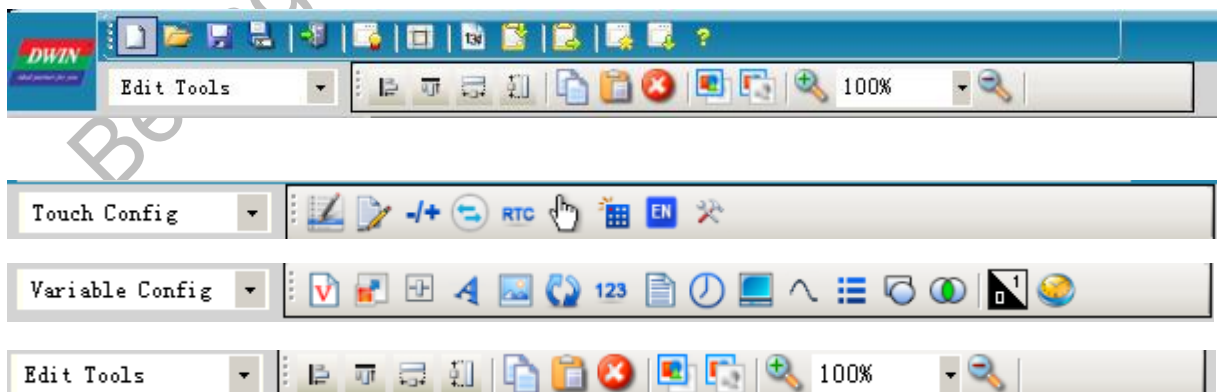
SP Address Setting: Set SP for variables.

Variables Preview: Preview buttons & variables.

Show Text: show the names of buttons & variables or not.



ToolBar:



Switching between "Touch Config" & "Variable Config" & Edit Tools using Navigation bar, or shortcut key F2, F3, F4.

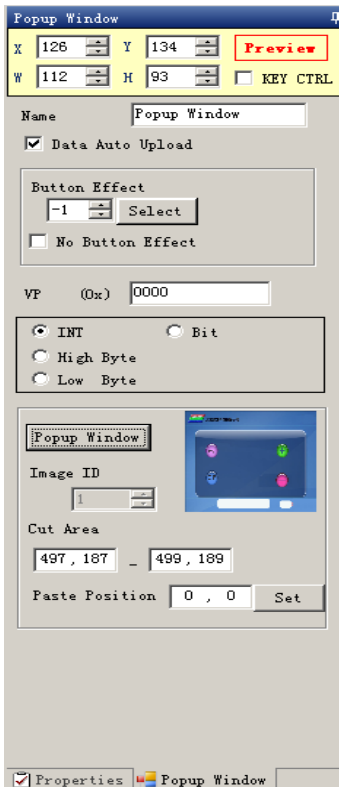
2. Main Functions of DGUS_SDK

Touch Config : users can use DGUS_SDK software to add buttons on screen, including Popup Window, Variable Data Input, Incremental Adjustment, Slider Adjustment, RTC Setting, Touch Control, Return Key Code, and ASCII Input. Buttons are shown as yellow rectangles in DGUS_SDK_V4.9. Users can also add press effect for buttons.

Variable Config : users can use DGUS_SDK to add variables on screen, including Variable Icon, Animation Icon, Slider, WordArt, Image Animation, Icon Rotation, Data Variable, Text Display, RTC Display, Analog Clock Display, Dynamic Trend Curve Display, Table Display, and Basic Graphic Display, Bit Icon, Timer Variable. Variables are shown as light-blue rectangles in DGUS_SDK_V4.9.

Parameter settings: users can use <System Properties> to adjust parameter settings of DGUS module. Parameter with "0x" in front should be filled with hex numbers.

2.1 Touch Config.



2.1.1 Popup Window

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls (Excel) file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

VP: variable pointer.

VAR Type:

INT: write key code in VP address (word).

High Byte: write low byte of key code in high byte of VP.

Low Byte: write low byte of key code in low byte of VP.

Bit: write data from last bit of key code into designated bit of VP address. (0x10 corresponds to VP.0, 0x1F corresponds to VP.F).

Popup Window: set window picture ID and window area.

Image ID: image ID of window picture.

Cut Area: cut area in image ID.

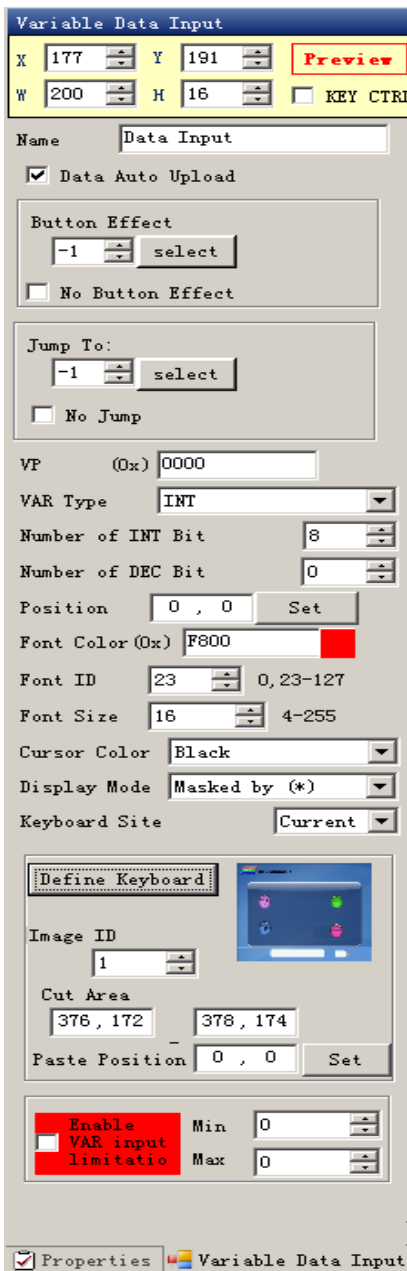
Paste Position: position of window on current screen.

Note: Only <Touch Control> buttons will work on popup window.

Illustration of button <Popup Window>:



Click <Stop> button - Window pops up - Select YES/NO.



2.1.2 Variable Data Input

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

VP: variable pointer.

VAR Type:

INT: integer.

LONGINT: long integer.

High byte: high byte in VP address.

Low byte: low byte in VP address.

Number of INT Bit: length of integer digits.

Number of DEC Bit: length of decimal digits.

Position: data position when typing.

Font Color: data color when typing.

Font ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Cursor Color: white/black cursor.

Display Mode: masked by (*)/direct display.

Define Keyboard:

Set the keyboard picture ID and the keyboard area.

Image ID: image ID of the keyboard area.

Cut Area: cut area in image ID.

Paste Position: position of the keyboard on current screen.

Enable VAR Input Limitation:

Set limits for inputting numbers.

Notes: Only <Touch Control> buttons will work on keyboard:

0x00F1 (Confirm), 0-9 corresponds to 0x0030 - 0x0039, 0x00F0 (Cancel), 0x00F2 (Backspace), 0x002D (+/-), 0x002E (.).

Ignore decimal point while setting range restriction for return value. E.g.: the setting is 3 integer bits and 2 decimal bits, and then the top limit is 10000, rather than 100.

Inputted data can be displayed by <Data Variable>, <WordArt> etc.

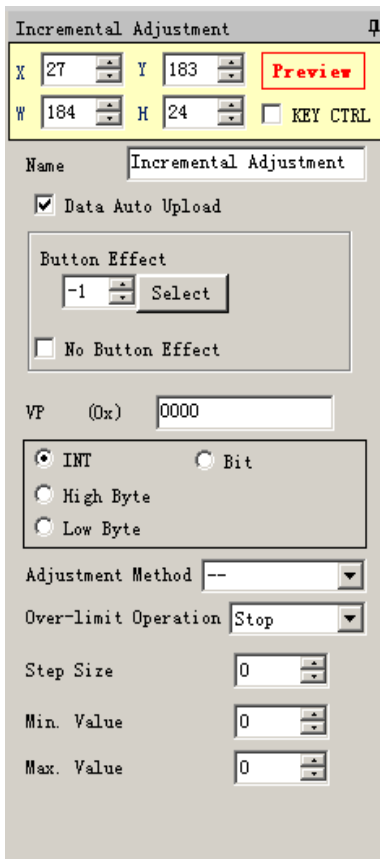
Illustration of button <Variable Data Input>:



Click text – Keyboard pops up – Type data – OK.

Click <Cancel> to interrupt input.

2.1.3 Incremental Adjustment



Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

VP: variable pointer.

VAR Type:

0x00: integer.

0x01: high byte in VP address.

0x02: low byte in VP address.

0x10 – 0x1F: adjust value in designated bit of VP address. (0x10 corresponds to VP.0, 0x1F corresponds to VP.F) **Step Size must be 0 or 1.**

Adjustment Method: ++/--.

Over-limit Operation: stop/ cycle.

Step Size: set step size for +/- buttons.

Min. Value: minimum value for adjustment.

Max. Value: maximum value for adjustment.

Adjusted data can be displayed by <Data variable>, <Icon variable>

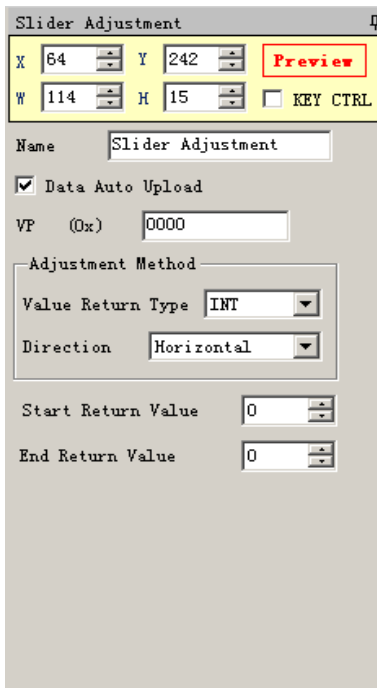
and <WordArt> etc.

Illustration of button <Incremental Adjustment>:



Click <+> or <-> to adjust corresponding value.

Hold the button to adjust continually.



2.1.4 Slider Adjustment

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

VP: variable pointer.

Value Return Type:

0x00: integer.

0x01: high byte in VP address.

0x02: low byte in VP address.

Direction: horizontal/vertical.

Start Return Value:

The value corresponding to left/top side of slider.

End Return Value:

The value corresponding to right/bottom side of slider.

This function is only for making touching area for slider. To display it, please use <Slider display> function.

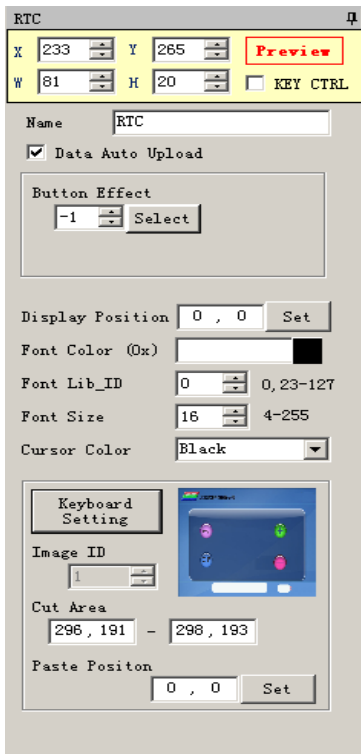
Adjusted data can be displayed by <Data variable>, <Variable icon> etc.

Illustration of button <Slider Adjustment>:



Hold the button over 0.5 second and slide the slider to modify number in the right, the value will also be changed.

2.1.5 RTC



Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Display Position: data position when typing.

Font Color: data color when typing.

Font Lib_ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Cursor Color: white/black cursor.

Keyboard setting:

Set the keyboard picture ID and the keyboard area.

Image ID: image ID of keyboard area.

Cut Area: cut area in image ID.

Paste Position: position of the keyboard on current screen.

Notes: A keyboard setting is the same as <Data Input>.

Use <RTC display> or <Analog clock display> to display current time.

Illustration of button <RTC>:



Click <RTC> button - Keyboard Pops Up - Clock Sets Up the Current Time.

Basic Touch

X: 338 Y: 217 Preview

W: 115 H: 34 KEY CTRL

Name: Basic Touch

Button Effect: -1 Select

☐ No Button Effect

Jump To: -1 Select

☐ No Jump

KeyValue: ☐ Full QWER Keyboard

0x:

Notes:

"Basic touch" used as Full QWER keyboard, please define via "set"

"Basic touch" used as Numerical keypad, please define manually according to bellow info:

Valid key code:

0x0030-0x0039 (0-9),

0x002E (.),

0x002D (+/-),

0x00F0 (Cancel),

0x00F1 (Confirm/OK),

0x00F2 (Backspace),

2.1.6 Touch Control

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

KeyValue:

Only <Touch Control> button works on keyboard area.

Valid key code range: 0x0030 - 0x0039 (0-9), 0x002E (.), 0x002D (+/-), 0x00F0 (Cancel), 0x00F1 (Confirm), 0x00F2 (Backspace).

Keycode

Keycode	Description
0030	
0031	
0032	

Delete Select Delete All

Def Keycode: 003C Add

Description:

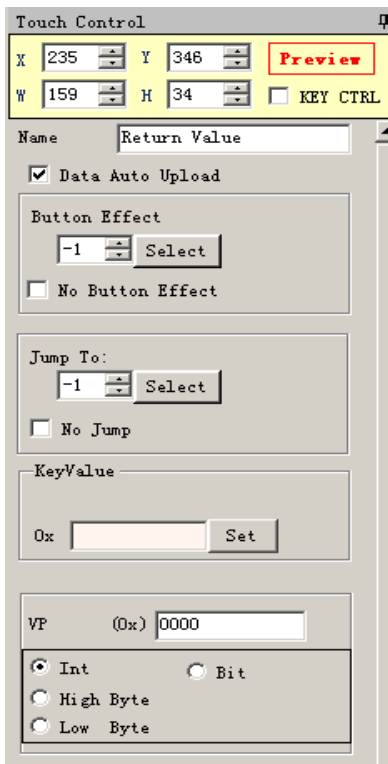
Save Select Cancel

Keycode

1	2	3	4	5	6	7
8	9	0	-	=	a	b
c	d	e	f	g	h	i
k	l	m	n	o	p	q
s	t	u	v	w	x	y
[]	\	:	'	,	/
Space			Enter			

Functional Keycode

Cancel	Return	CapsLock
Delete	Left	Right
Backspace		



The screenshot shows the 'Touch Control' configuration window. At the top, there are coordinate fields: X (235), Y (348), W (159), and H (34). A 'Preview' button is next to the Y field. Below these is a 'KEY CTRL' checkbox. The 'Name' field is set to 'Return Value'. The 'Data Auto Upload' checkbox is checked. Under 'Button Effect', there is a '-1' value and a 'Select' button. The 'No Button Effect' checkbox is unchecked. Under 'Jump To:', there is also a '-1' value and a 'Select' button. The 'No Jump' checkbox is unchecked. The 'KeyValue' section has an 'Ox' field and a 'Set' button. The 'VP' section has a '(Ox)' field set to '0000'. At the bottom, there are radio buttons for 'Int', 'High Byte', 'Low Byte', and 'Bit', with 'Int' selected.

2.1.7 Return Key Code

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

KeyValue: self-defined keyValue for buttons.

VP: variable pointer.

VP Type:

Save in VP address.

Save in high byte of VP address.

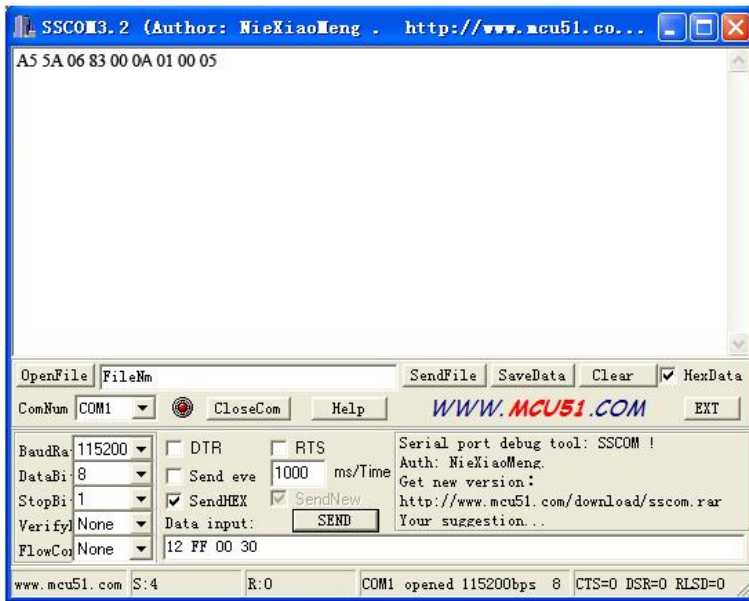
Save in low byte of VP address.

Save in specified bit of VP address.

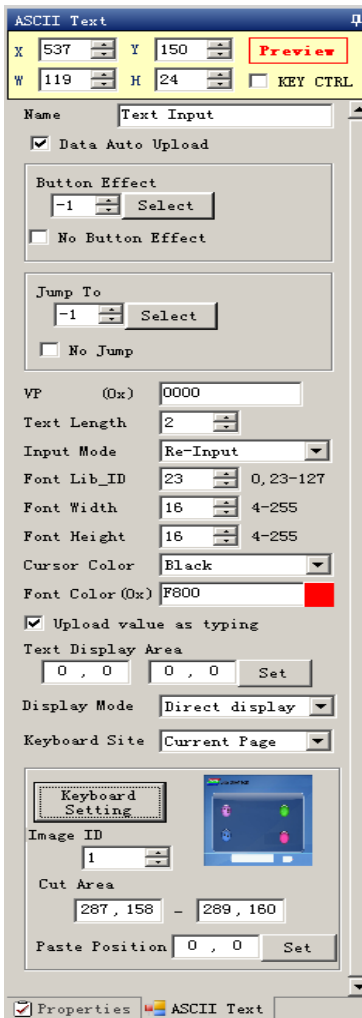
Illustration of button <Return Key Code>:



Set a <Return Key Code> button, of which VP is 0x000A, key value is 0x0005.



DGUS module auto uploads data 0005 to serial port as shown.



2.1.8 ASCII Input

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

VP: variable pointer.

Text Length: length of text, by word, range from 1 to 123.

Input Mode: re-input/ edit text.

Font Lib_ID: address of ASCII font file.

Font Width: horizontal pixel numbers.

Font Height: vertical pixel numbers.

Cursor Color: white/black.

Font Color: data color when typing.

Upload value as typing: tying status upload.

Text Display Area: data position on screen when typing.

Keyboard Displayed in: Current Page/Other Page.

Keyboard Setting:

Set the keyboard picture ID and the keyboard area.

Image ID: image ID of the keyboard area.

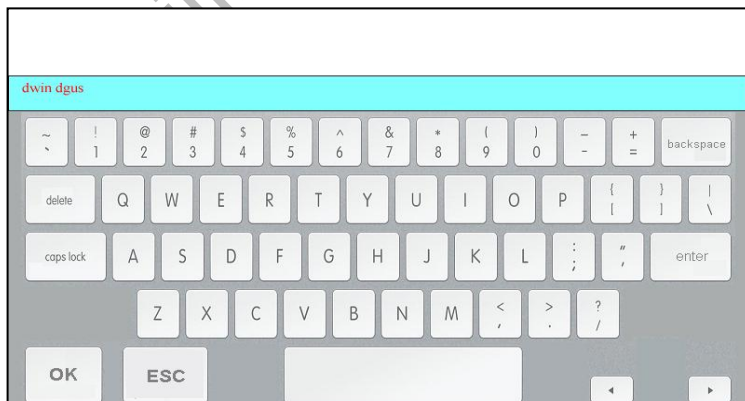
Cut Area: cut area in image ID.

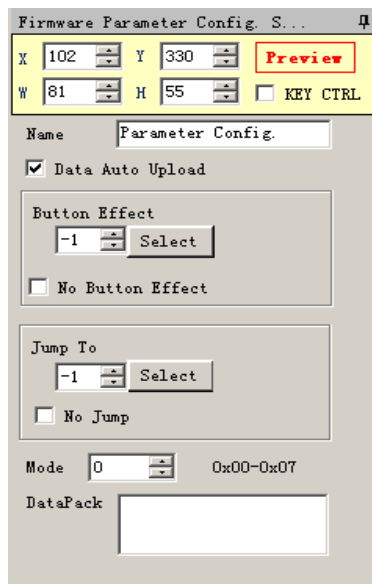
Paste Position: position of the keyboard on current screen.

Note: Create <Touch control> buttons on keyboard to define the key code of the button (0x4161 indicates "A").

Inputted data can be displayed with <Text display> function.

Illustration of button <ASCII Input>:





2.1.9 Firmware Parameter Settings

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

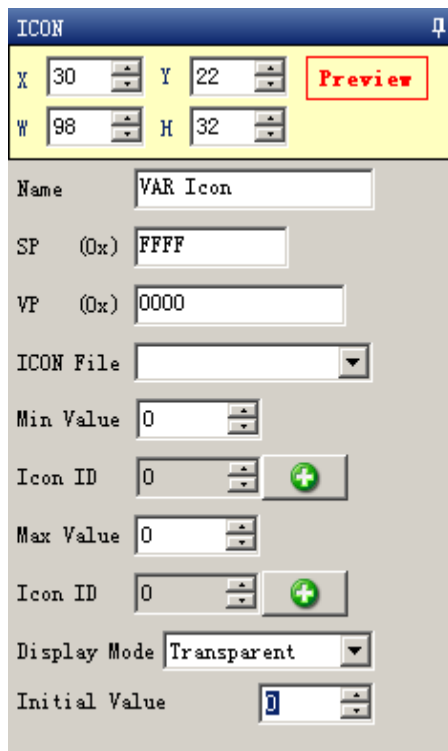
Mode: setup mode.

DataPack: data pack of setup.

Setup Mode

Mode	Data Pack	Description	Function																																																								
0x00	No	No	Transmit data from register to variable SRAM in 0x6F00 to 0x6FFF (low bytes).																																																								
0x01	No	No	Transmit data from address 0x6F00 to 0x6FFF in variable SRAM (low bytes) to register and reset module parameters including R1-R3, R5-RA.																																																								
0x02	Tran_Area	Coordinates of top-left and bottom-right of area.	Convert designated area to monochrome bitmap (vertical mode) and save the data to designated VP address. A. Width (Xe-Xs+1) should be even. B. Height (Ye-Ys+1) should be multiple of 8. C. VP data format shown as below: VP: status indicator, refreshed to 0x5555 after operation. VP+1: horizontal length, by word. (Xe-Xs+1) &0xFFFE/2 VP+2: numbers of data segment. (Ye-Ys+1) &0xFFF8/8 VP+3: bitmap data, with MSB priority. If the key code automatically upload is enabled (R2.3=1), module will upload message (value in VP address upload to 0x5555) to serial port. The command is mainly for printing of current screen.																																																								
	*VP	VP address for restoring bitmap data.																																																									
	<table><tr><td></td><td>X=0</td><td>X=1</td><td>X=2</td><td>X=3</td><td>...</td><td>X=126</td><td>X=127</td></tr><tr><td>Y=0</td><td>D0.15</td><td>D0.7</td><td>D1.15</td><td>D1.7</td><td></td><td>D63.15</td><td>D63.7</td></tr><tr><td>...</td><td>...</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Y=7</td><td>D0.8</td><td>D0.0</td><td>D1.8</td><td>D1.0</td><td></td><td>D63.8</td><td>D63.0</td></tr><tr><td>Y=8</td><td>D64.15</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>...</td><td>...</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Y=15</td><td>D64.8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>				X=0	X=1	X=2	X=3	...	X=126	X=127	Y=0	D0.15	D0.7	D1.15	D1.7		D63.15	D63.7							Y=7	D0.8	D0.0	D1.8	D1.0		D63.8	D63.0	Y=8	D64.15													Y=15	D64.8						
		X=0		X=1	X=2	X=3	...	X=126	X=127																																																		
Y=0	D0.15	D0.7	D1.15	D1.7		D63.15	D63.7																																																				
...	...																																																										
Y=7	D0.8	D0.0	D1.8	D1.0		D63.8	D63.0																																																				
Y=8	D64.15																																																										
...	...																																																										
Y=15	D64.8																																																										
0x03	*VP	Variable pointer.	Upload data in designated VP address to serial port. Range of Tx_LEN: 0x0001-0xFFFF.																																																								
	Tx_LEN	Length of data to be sent.																																																									
0x04	Same function with 0x03, uploading data to COM2 (reserved port).																																																										
0x05	Tran_Area	Coordinates of top-left and bottom-right of area.	Convert designated area to monochrome bitmap (horizontal mode) and save the data to designated VP address. A. Width (Xe-Xs+1) should be multiple of 16. B. VP data format as shown below: VP: status indicator, refreshed to 0x5555 after operation. VP+1: horizontal length, by word. (Xe-Xs+1) &0xFFF0/16 VP+2: numbers of data segment. (Ye-Ys+1) VP+3: bitmap data, with MSB priority. If the key code automatically upload is enabled (R2.3=1), module will upload message (value in VP address upload to 0x5555) to serial port. The command is mainly for printing of current screen.																																																								
	*VP	VP address for restoring bitmap data.																																																									
0x06	Frame_Head	Frame header (2byte)	Send the current touched position to COM2 (serial port for reserving the system), the format is: Frame_Head + X + Y + Check (The cumulative Sum for 1 byte of X, Y) + Frame_end.																																																								
	Frame_End	Frame end (2byte)																																																									

2.2 Variable Config.



ICON

X 30 Y 22 Preview

W 98 H 32

Name VAR Icon

SP (0x) FFFF

VP (0x) 0000

ICON File

Min Value 0

Icon ID 0

Max Value 0

Icon ID 0

Display Mode Transparent

Initial Value 0

2.2.1 Variable Icon

Selected Area: (X, Y) are the top-left coordinates of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Set SP to load description data into variable SRAM.

0xFFFF: load description data from configuration file.

VP: variable pointer.

ICON File: address of icon file.

Min/Max value: limits of variables, null if over limit.

Icon ID:

Icon address in icon file corresponding to the min/max value.

Display Mode: transparent/background.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Illustration of variable <Variable Icon>:



Change the value in VP address to display different icons.

Animation ICON

X: 88 Y: 98 **Preview**

W: 154 H: 24

Name: Animation icon

SP (0x): FFFF

VP (0x): 0000

V_Stop: 0

V_Start: 0

ICON File:

ICON_Stop: 0

ICON_Start: 0

ICON_End: 0

ICON Display Mode: Transparent

Initial Value: 0

2.2.2 Animation Icon

Selected Area: (X, Y) are the top-left coordinates of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

V_Stop: set value to stop animation.

V_Start: set value to start animation.

ICON File: address of icon file.

ICON Stop: icon at V_stop value.

Icon_Start/Icon_End:

Start/end icon for animation at V_start Value.

ICON Display Mode: transparent/background.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Illustration of variable <Animation Icon>:

When value in VP address is 0, screen display icon 0:



When value in VP address is 9, animation starts.



.....



.....



Slider

X 140 Y 185 **Preview**

W 121 H 39

Name Slider Display

SP (0x) FFFF

VP (0x) 0000

Start Value 0

End Value 0

Slider Mode Horizontal

ICON File

ICON ID 0

Display Mode Transparent

Y Coordinate 185

(X)Coordinate offset 0 (0--255)

VAR Type Word

Initial Value 0

The system default Start/End coordinates of slider have been set as per the original chosen range of slider.

2.2.3 Slider

Selected Area: (X, Y) are the top-left coordinates of icons.

X, W is start/end point of horizontal slider.

Y, H is start/end point of vertical slider.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Start/End Value: value corresponding to start/end point.

Slider Mode: horizontal/vertical.

ICON File: address of icon file.

ICON ID: icon address in icon file.

Display Mode: transparent/background.

Coordinate Offset:

Offset to the left/top.

VAR Type:

Integer (whole VP address).

High byte in VP address.

Low byte in VP address.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Note: Set same VP address for <Slider> button and <Slider display> variable to combine them.

<Slider display> is also used as progress bar.



Send command to serial port:

Frame header, Length, Command, VP, Data string to display the Slider and Data above.

A5 5A 05 82 000C 002C

WordArt VAR Setting

X: 104 Y: 280 Preview

W: 108 H: 26

Name: WordArt variable

SP (0x): FFFF

VP (0x): 0000

ICO File:

ICONO: 0

ICON ID Corresponded To 0, The Sequence Is 0123456789-

ICON Display Mode: Transparent

VAR Type: INT

Number of INT Bit: 8

Number of DEC Bit: 0

Alignment: Left Align

Initial Value: 0

2.2.4 WordArt

Selected Area: (X, Y) are the top-left coordinates of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

ICON File: address of icon file.

ICON 0: icon address corresponding to number 0.

ICON Display Mode: transparent/background.

VAR Type: integer/long integer.

Number of INT/DEC bit: length of integer/decimal digits.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Illustration of variable <WordArt>:



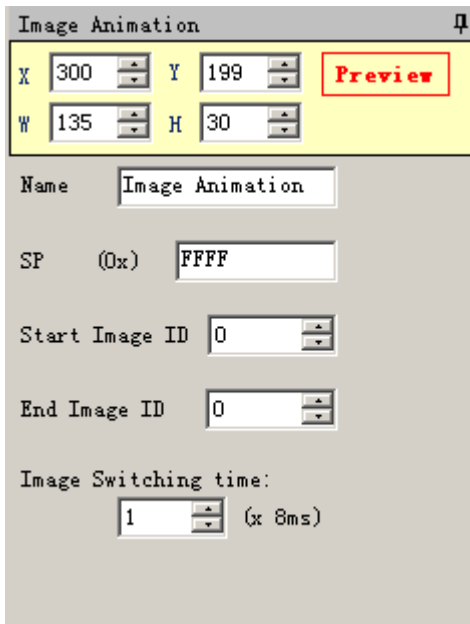
Send command to serial port:

Frame header, Length, Command, VP, Data string to display the WordArt above.

A5 5A 05 82 0CCC 0017

2.2.5 Image Animation

Selected Area: (X, Y) are the top-left coordinates of icons.



The dialog box is titled "Image Animation". It contains the following fields and controls:

- X:** 300
- Y:** 199
- W:** 135
- H:** 30
- Preview:** A red button with the text "Preview".
- Name:** Image Animation
- SP (0x):** FFFF
- Start Image ID:** 0
- End Image ID:** 0
- Image Switching time:** 1 (x 8ms)

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Start Image ID: select starting picture of animation.

End Image ID: select ending picture of animation.

Image Switching Time:

Select switching speed for animation, by every 8ms.

!

Start image ID should be less than end image ID.

Set a <image animation> on end image to loop.

Send commands or set <touch control> button to interrupt animation.

ICON Rotation

X 278 Y 71

W 119 H 32

Preview

Name Icon Rotation

SP (0x) FFFF

VP (0x) 0000

ICON File

ICON ID 0

ICON Rotation Center:

X 0 Y 0

The rotation center of screen has been set as the left-up coordinate of the button by system default setting.

Initial VAR Value 0

End VAR Value 0

Initial Rotation Angle 0

End Rotation Angle 0

Rotation Angle :

0-720 (0x000-0x2D0), Unit 0.5 degree

ICON Display Mode

Transparent

VP_Mode INT

Initial Value 0

2.2.6 Icon Rotation

Selected Area: (X, Y) are the coordinates of rotating center.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

ICON File: address of icon file.

ICON ID: icon address in icon file.

ICON Rotation Center:

Select rotation center (X, Y) for the icon.

Initial/End VAR Value:

Value corresponding to start/end angle, null if over limit.

Initial/End Rotation Angle:

Select start/end angle, ranging from 0 to 720, by every 0.5°.

Display Mode: transparent/background.

VP_Mode:

Integer (whole VP address).

High byte in VP address.

Low byte in VP address.


Initial Value: Set the initial value & save it in the 22 config


file, the system will be initiated according to 22 config file when the DGUS is started.

Send serial commands or press buttons to change value in VP address, and then to adjust the angle of pointer.

Illustration of variable <Icon Rotation>:

Icons file for rotation:





Send command to serial port:

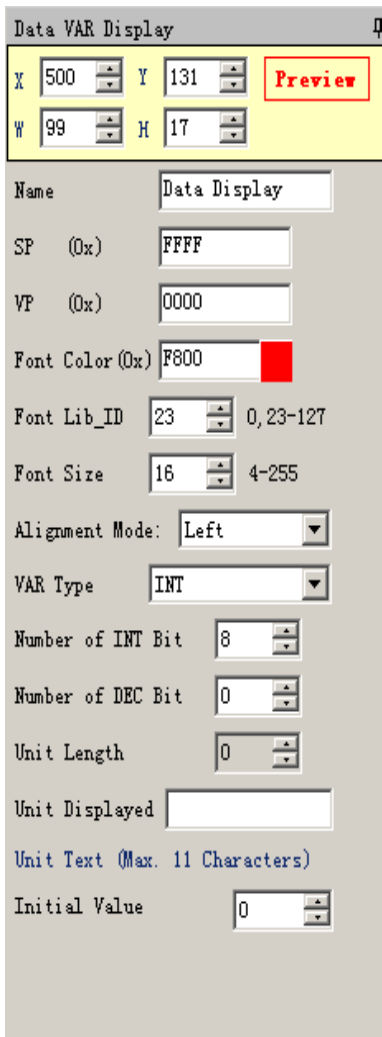
Frame header, Length, Command, VP, Data string to display the ICON above.

A5 5A 05 82 000A 0084

Beijing DWIN Technology Co., Ltd.

24

www.dwin.com.cn



Data VAR Display

X: 500 Y: 131 **Preview**

W: 99 H: 17

Name: Data Display

SP (0x): FFFF

VP (0x): 0000

Font Color (0x): F800

Font Lib_ID: 23 0, 23-127

Font Size: 16 4-255

Alignment Mode: Left

VAR Type: INT

Number of INT Bit: 8

Number of DEC Bit: 0

Unit Length: 0

Unit Displayed:

Unit Text (Max. 11 Characters):

Initial Value: 0

2.2.7 Data Variable

Selected Area: (X, Y) are the top-left coordinates of data.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Font Color: data color.

Font Lib_ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Alignment Mode: Right/Left /Centered.

VAR Type:

0x00: integer.

0x01: long integer.

0x02: high byte in VP address.

0x03: low byte in VP address.

Number of INT Bit: length of integer digits.

Number of DEC Bit: length of decimal digits.

Unit Length:

Corresponding to displayed unit automatically.

Unit Displayed:

ASCII unit for data, max length is 11 bytes.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Send commands or set buttons to modify displayed data.

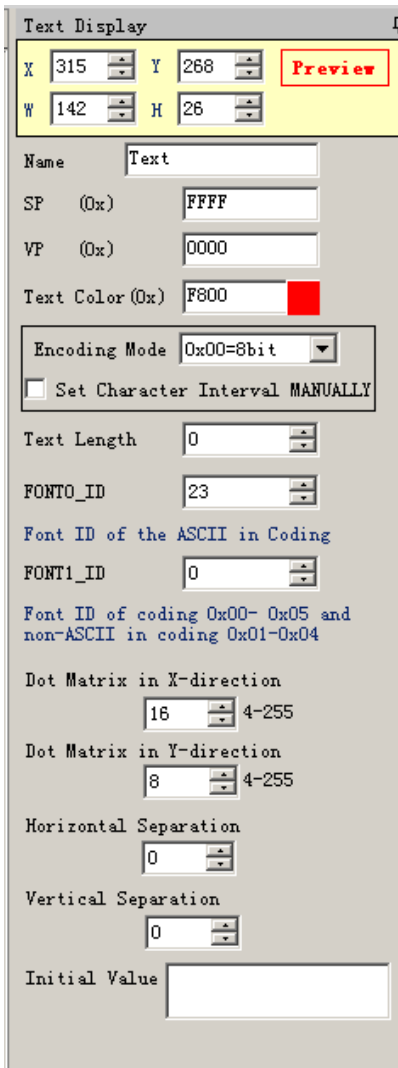
Illustration of variable <Data Variable>:



Send command to serial port:

Frame header, Length, Command, VP, Data string to display the Data (left-up) above.

A5 5A 05 82 0000 0022



Text Display

X: 315 Y: 268 Preview

W: 142 H: 26

Name: Text

SP (0x): FFFF

VP (0x): 0000

Text Color (0x): F800

Encoding Mode: 0x00=8bit

☐ Set Character Interval MANUALLY

Text Length: 0

Font0_ID: 23

Font ID of the ASCII in Coding

Font1_ID: 0

Font ID of coding 0x00- 0x05 and non-ASCII in coding 0x01-0x04

Dot Matrix in X-direction: 16 4-255

Dot Matrix in Y-direction: 8 4-255

Horizontal Separation: 0

Vertical Separation: 0

Initial Value:

2.2.8 Text Display

Selected Area:

(X, Y) are top-left coordinates of data.

Textbox is the selected area.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Text Color: data color.

Encoding Mode:

0x00: 8bit encoding, 0x01: GB2312, 0x02: GBK, 0x03:BIG5, 0x05: UNICODE.

Set Character Interval MANUALLY: on/off.

Text Length: select text length, by byte.

Font0_ID: address of ASCII font file.

Font1_ID: address of non-ASCII font file.

Dot Matrix in X/Y-direction: select font size. **Please note that parameter should be the same with the size of font file.**

Horizontal/Vertical Separation:

Pixel distance in Horizontal/Vertical.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Illustration of variable <Text Display>:



Send command to serial port:

Frame header, Length, Command, VP, Data string to display the Text (bottom-left) above.

A5 5A 0D 82 0008 64 77 69 6E 20 64 67 75 73 76

RTC

X

447

Y

212

Preview

W

109

H

37

Name

RTC

SP (0x)

FFFF

Font Color

F800

Font Lib_ID

23

Font Size

16

(4-255)

Date Format

Y-M-D H:Q:S W

Coding String. It is consisted of RTC coding list and ASCII

RTC Coding:

Content	Coding
Year	Y
Month	M
Day	D
Hour	H
Minute	Q
Second	S
Week	W

E.g. If the time is

2012-05-02 12:00:00 Wed.

Y-M-D H:Q:S Will be shown as

2012-05-02 12:00:00

M-D W H:Q will be shown as

05-02 WED 12:00

2.2.9 Digital RTC Display

Selected Area: (X, Y) are the top-left coordinates of data.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Font Color: data color.

Font Lib_ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Date Format: refer to the red texts in picture in the left.

Use <RTC> button to modify current time.

Illustration of variable <Digital RTC Display> (Digital clock on bottom-right of screen):



Analog Clock Display

X 468 Y 325 Preview

W 70 H 14

Name Clock Display

SP (0x) FFFF

The center of analog clock is the left-up coordinate of chosen area. Also the intersecting point of H/Q/S arms.

ICON File

☐ Hide Hour Hand

ICON Hour FFFF +

Center Coordinate 0 , 0

☐ Hide Minute Hand

ICON Minute FFFF +

Center Coordinate 0 , 0

☐ Hide Second Hand

ICON Second FFFF +

Center Coordinate 0 , 0

2.2.10 Analog Clock Display

Selected Area: (X, Y) are the rotating center coordinates.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

ICON File: address of icon file.

Analog Clock:

ICON Hour: select hour hand ID in icon file.

Center Coordinate: rotation center in icon.

Minute Hand:

ICON Minute: select minute hand ID in icon file.

Center Coordinate: rotation center in icon.

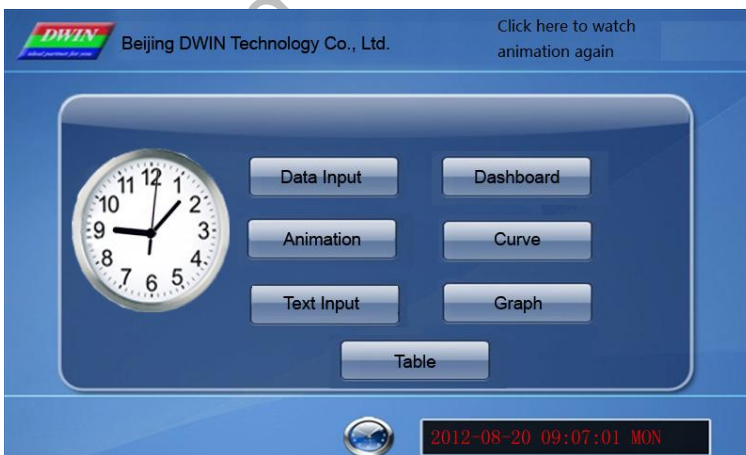
Second Hand:

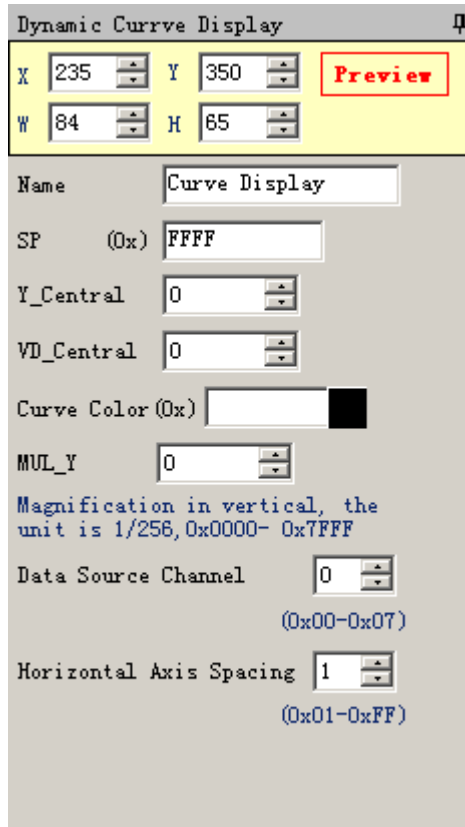
ICON Second: select second hand ID in icon file.

Center Coordinate: rotation center in icon.

Use <RTC> button to modify current time.

Illustration of variable <Analog Clock Display>:





Dynamic Curve Display

X: 235 Y: 350 Preview

W: 84 H: 65

Name: Curve Display

SP (0x): FFFF

Y_Central: 0

VD_Central: 0

Curve Color (0x):

MUL_Y: 0

Magnification in vertical, the unit is 1/256, 0x0000- 0x7FFF

Data Source Channel: 0 (0x00-0x07)

Horizontal Axis Spacing: 1 (0x01-0xFF)

2.2.11 Dynamic Trend Curve

Selected Area: select window area, null if over range.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Y_Central: select center line of trend curve.

VD_Central:

Trend curve value at center line, normally average of Max & Min value.

Curve Color: select color for trend curve.

MUL_Y: magnification in Y direction, by every 1/256.

Data Source Channel: select channel for trend curve.

Horizontal Spacing:

Transverse spacing between sampling points.

Illustration of variable <Dynamic Trend Curve Display>:



Send command to serial port:

Frame header, Length, Command, Data channel, Data string to display the trend curve above.

A5 5A 18 84 01 0800 0700 0710 0733 0800 0800 0800
0800 0900 0908 0906

2.2.12 Table Display

Table Display	
X	403
Y	168
W	79
H	10
Preview	
Name	Table Display
SP (0x)	FFFF
VP (0x)	0000
Column Number	1
Row Number	1
Start Display Column	1
Start Display Row	1
Unit_Data_Num (0x)	0
<p>When Unit_Data_Num=0x00, the address for the content of the table will be shifted (TAB_X_Num/2) bytes (Upward round). E.g. *VP=0x1000, TAB_X_Start=0x07 then, 0x1000-0x1003 sequentially stored data length information of Row 0-6, the low byte of 0x1003 is not occupied, therefore the content of the table will be stored in 0x1004 and thereafter</p>	
Encoding Mode	0x00=8bit
<input type="checkbox"/> Set Character Interval MANUALLY <input type="checkbox"/> Direct indication <input type="checkbox"/> Displaying border	
Boarder Color	
Text Color	
FONT0_ID	0, 23-127
Font location of the ASCII in coding 0x01-0x04	
FONT1_ID	0, 23-127
Font location of coding 0x00x05, and non-ASCII in coding 0x01-0x04	
X-Direction Size	16, 4-255
Y-Direction Size	16, 4-255
Column Header	Invalid Displ
Row Header	Invalid Displ

Selected Area: select table area, null if over range.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer, starting address of the data in table.

Column/Row Number: set the size of table.

Start Display Column/Row:

Select starting column/row to be displayed.

Unit_Data_Num:

0x01-0x7F: length of data for one cell.

0x00: data in VP address defines the length of each column.

When Unit_Data_Num is 00, starting address of data will be (Row number/2, round up to integer) backward from VP address.

Encoding Mode:

0x00: 8bit, 0x01: GB2312, 02: GBK, 03: BIG5, 04: SJIS, 05: UNICODE.

Set Character Interval MANUALLY: on/off.

Boarder Color: select table boarder color.

Text Color: select text color.

FONT0_ID: address of ASCII font file.

FONT1_ID: address of none-ASCII font file.

X/Y-Direction Size:

Select font size, accordant with width of fonts in font file.

Column Header: Valid Display/Invalid Display.

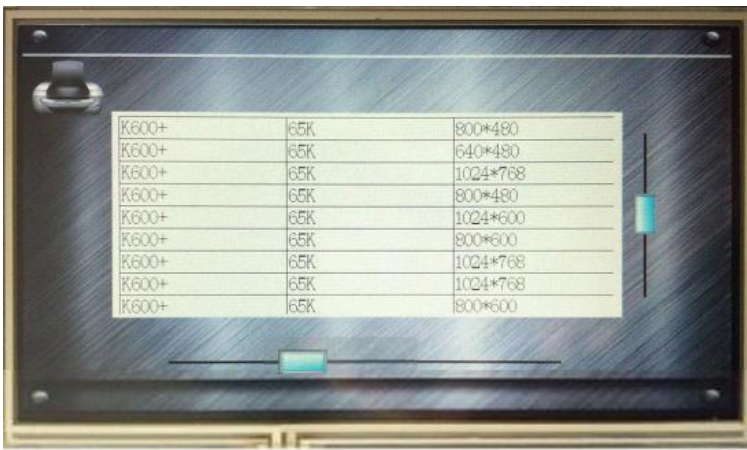
Row Header: Valid Display/Invalid Display.

Data for table can be loaded by 22.bin file. Refer to DGUS document for detailed instruction.

Illustration of variable <Table Display>:



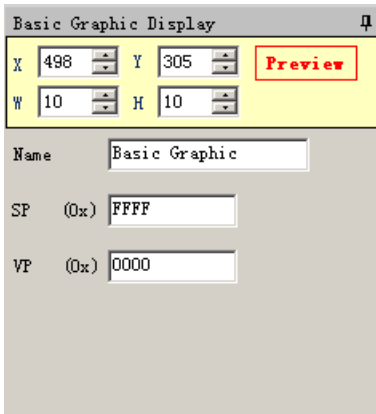
尺寸	比例	型号
7.0	169	DMT80480C070_02W
8.0	43	DMT80600C080_02W
3.5	43	DMT32240T035_02W
4.3	169	DMT48270T043_02W
5.0	169	DMT80480T050_01W
5.5	43	DMT64480T055_03W
5.7	43	DMT10768T057_01W
7.0	169	DMT80480T070_06W



K600+	65K	800*480
K600+	65K	640*480
K600+	65K	1024*768
K600+	65K	800*480
K600+	65K	1024*600
K600+	65K	800*600
K600+	65K	1024*768
K600+	65K	1024*768
K600+	65K	800*600

If the length of data is shorter than designated, please use 0xFFFF as end mark of data in this cell.

For oversized table, users can use slider to pull the table.



Basic Graphic Display

X: 498 Y: 305 Preview

W: 10 H: 10

Name: Basic Graphic

SP (0x): FFFF

VP (0x): 0000

2.2.13 Basic Graphic Display

Selected Area: select window area, null if over range.
(Limit is only effective for 0x0001 - 0x0005 commands).

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

String Format

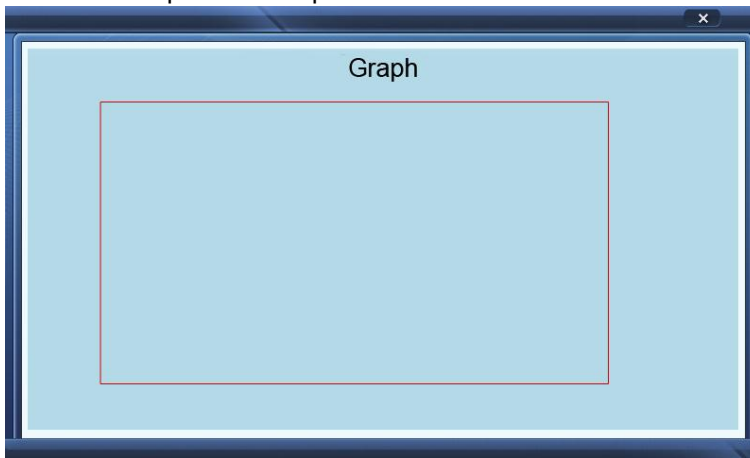
Address	Definition	Description
VP	CMD	Command
VP+1	Data_Pack_Num_Max	Data Pack Number
VP+2	DATA_Pack	

Data Pack for Basic Graphic

CMD	Function	Description of Data Pack Format, by word			
		Relative Address	Length	Definition	Description
0x0001	Dot	0x00	2	(x, y)	Dot coordinates.
		0x02	1	Color	Dot color.
0x0002	Line	0x00	1	Color	Line color.
		0x01	2	(x, y)0	Vertex 0 coordinates.
		0x03	2	(x, y)1	Vertex 1 coordinates.
		0x01+2*n	2	(x, y)n	Vertex n coordinates.
0x0003	Rectangle	0x00	2	(x, y)s	Top-left coordinates.
		0x02	2	(x, y)e	Bottom-right coordinates.
		0x04	1	Color	Rectangle's color.
0x0004	Rectangle Area Fill	0x00	2	(x, y)s	Top-left coordinates.
		0x02	2	(x, y)e	Bottom-right coordinates.
		0x04	1	Color	Filled color.
0x0005	Circle	0x00	2	(x, y)	Circle center coordinates.
		0x02	1	Rad	Radius of circle.
		0x03	1	Color	Circle color.
0x0006	Picture cut/paste	0x00	1	Pic_ID	Image ID of cutting area.
		0x01	2	(x, y)s	Top-left coordinates of the cutting area.
		0x03	2	(x, y)e	Bottom-right coordinates of the cutting area.
		0x05	2	(x, y)	Paste position on current screen.
0x**07	Icon Display	0x00	2	(x, y)	Top-left coordinates of icon.
		0x02	1	ICON_ID	Icon ID in icon file, high byte of command specifies address of icon file, display mode is transparent.
0x0008	Area fill	0x00	2	(x, y)	Sampling dot coordinates.
		0x02	1	COLOR	Filled color.
0x0009	Vertical line	0x00	1	Color0	Connect (X0, Y0s) (X0, Y0e) with color 0
		0x01	1	X0	
		0x02	1	Y0s	
		0x03	1	Y0e	

Judging condition:

0xFF: finish operation,
0xFE: skip to next step.



Send command to serial port:

Frame header, Length, Command, Address, Controlling bytes, Data pack, Coordinate, Color
A5 5A 11 82 20 00 00 03 00 01 00 64 00 64 02 8C 01 90 F8 00

To get the rectangle above.

Special Industrial Application

X
395
Y
34
Preview

W
90
H
38

Name
Industrial App

SP
(0x)
FFFF

VP
(0x)
0000

2.2.14 Special Industrial Application

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

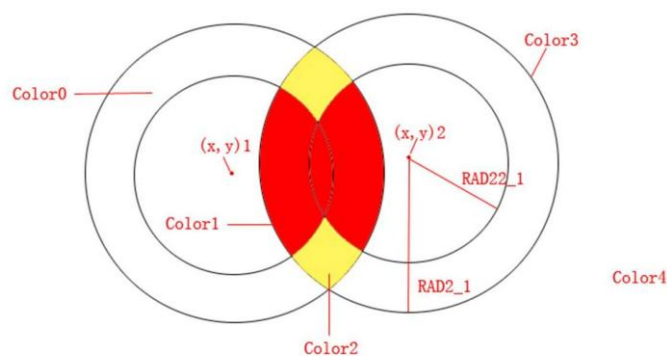
VP: variable pointer.

String Format

Address	Definition	Description
VP	CMD	Command
VP+1	Data_Pack_Num_Max	Data Pack Number
VP+2	DATA_Pack	

Data pack for Special Industrial Application

CMD	Function	Description of data pack format, by word			
		Relative Address	Length	Definition	Description
0x0001	Overlapped Area of Multiple Circles Fill	0x00	1	Color0	Color of "Safe Zone".
		0x01	1	Color1	Color of normally overlapped area (Overlapped once).
		0x02	1	Color2	Color of High-Risk overlapped area (Overlapped twice or more).
		0x03	1	Color3	Color of circles.
		0x04	1	Color4	Color of evasion.
		0x05	4	Disp_Area	Display area, null if over range.
		0x09+4*n	2	(x, y)n	Center coordinates of No. n.
		0x0B+4*n	1	RADn_1	The bigger radius of No. n concentric circles.
		0x0C+4*n	1	RAD2n_2	The smaller radius of No. n concentric circles.



Bit Icon

X 230 Y 268

W 59 H 87

Preview

Name Bit icon

SP (0x) FFFF

VP (0x) 0000

AP (0x)

Bit Icon ON (1) / OFF (0):
1111111111111111

Set

Disp. Mode 0x00

Align Mode 0x00

Interval 0

Icon File ID

ICON0S 0

ICON0E 0

ICON1S 0

ICON1E 0

ICON Mode Transparent

Initial Value 0

2.2.15 Bit Variable Icon

Selected Area: (X, Y) are coordinates of top-left of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

AP: substitutive variable pointer, reserved 2 words.

Bit Icon ON (1) /OFF (0): define BITS to display.

Disp. Mode: shown as the following table.

Align Mode:

0x00: X++, space unreserved for undesignated bits.

0x01: Y++, space unreserved for undesignated bits.

0x02: X++, space reserved for undesignated bits.

0x03: Y++, space reserved for undesignated bits.

Interval: spacing between icons.

Icon File ID: address of icon file.

ICON0S:

Icon ID for bit0 in non-animation mode, or starting

Icon ID for bit0 in animation mode.

ICON0E: ending icon ID for bit0 in animation mode.

ICON1S:

Icon ID for bit1 in non-animation mode, or starting

Icon ID for bit1 in animation mode.

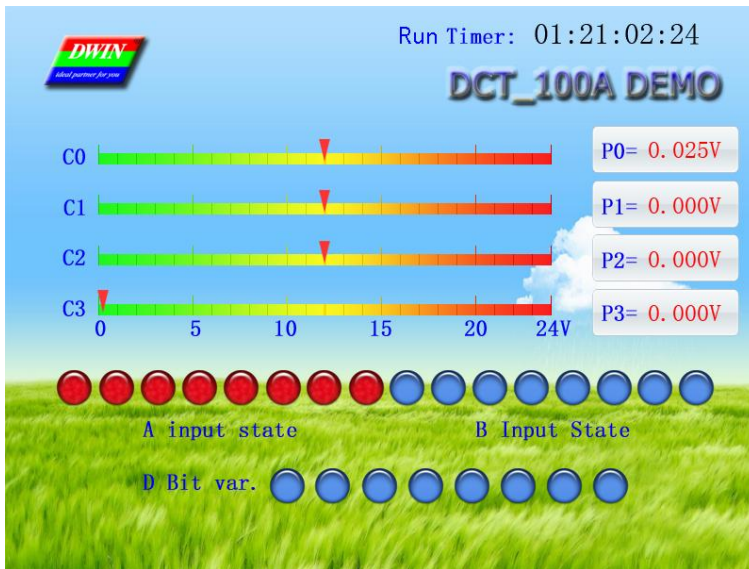
ICON1E: ending icon ID for bit1 in animation mode.

ICON Mode: Transparent/Opaque.

Initial Value: Set the initial value & save it in the 22 config file,the system will be initiated according to 22 config file when the DGUS is started.

Display_Mode	Value of bit	
	0	1
0x00	ICON0S	ICON1S
0x01	ICON0S	Null.
0x02	ICON0S	Animation: ICON1S - ICON1E.
0x03	Null.	ICON1S
0x04	Null.	Animation: ICON1S - ICON1E.
0x05	Animation: ICON0S - ICON0E.	ICON1S
0x06	Animation: ICON0S - ICON0E.	Null.
0x07	Animation: ICON0S - ICON0E.	Animation: ICON1S - ICON1E.

Illustration of variable <Bit Icon> (on bottom of screen):



Timer Variable

X 533 Y 299

W 46 H 67

Preview

Name Time VAR

SP (0x) FFFF

VP (0x) 0000

Color F800

Font Lib ID 23 0, 23-127

Font Size 16 4-255

Data length (Bytes) 1

ASCII Separators

Convert

Hex Separators

Encoded separators string, used to define the format of Timer.

Every time a Timer data (BCD code) is read, one ASCII char will be added after as separator.

Some special chars:

0x00: None. Timer data will be concatenated.

0x0D: New line.

2.2.16 Timer Variable

Selected Area: (X, Y) are the top-left coordinates of data.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Color: data color.

Font Lib ID: address of font file, 8bit encoding half-width.

Font Size: font size in X-direction.

Data length (Bytes): byte numbers to be displayed.

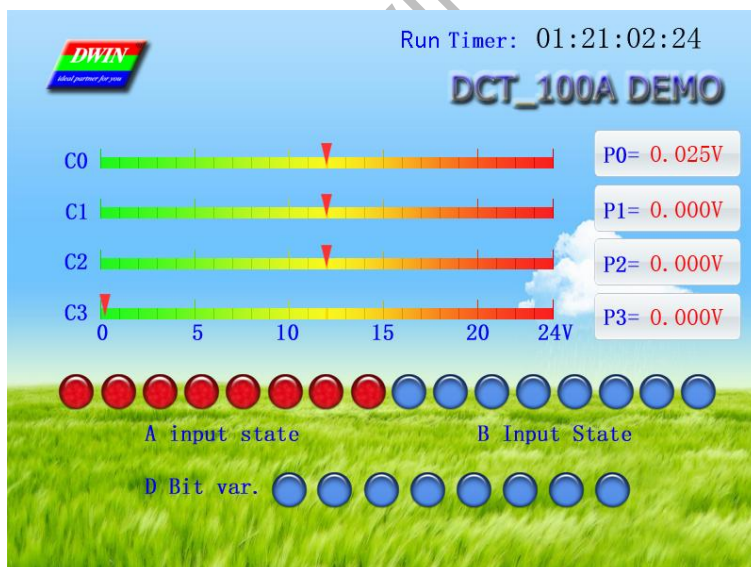
ASCII Separators: data string.

Convert: convert ASCII Separators into Hex Separators.

Encoded separators string, used to define the format of Timer. Every time a Timer data (BCD code) is read, one ASCII char will be added after as separator.

Some special chars: 0x00: none, Timer data will be concatenated; 0x0D: new line.

Illustration of variable <Bit Icon> (on top-right of screen):



3. Commands

3.1 Data Frame

Serial data frame is constituted with 5 parts as shown in chart below:

Data Block	1	2	3	4	5
Definition	Frame header	Data length	Command type	Data string	CRC checksum
Data Length	2	1	1	N	2
Description	Defined by R3 and RA parameter in config.txt	Including command type, data string and CRC checksum	0x80-0x84		Enabled by R2 parameter in config.txt

3.2 Command Set

Function	CMD	Data	Description
Access Register	0x80	ADR(0x00-0xFF)+Data_Pack	Write data in particular address of register
	0x81	ADR(0x00-0xFF)+RD_LEN(0x00-0xFF)	Read data in particular address of register
		ADR(0x00-0xFF)+RD_LEN+Data_Pack	Response of DWIN LCD module
Access Variable SRAM	0x82	ADR_H:(0x0000-0x6FFF)+DATA0...+DATA _n	Write data in particular address of variable SRAM
	0x83	ADR_H: L(0x0000-0x6FFF)+RD_LEN(0x00-0x7F)	Read data in particular address of variable SRAM
		ADR_H: L+RD_LEN+DATA0.....+DATA _n	Response of DWIN LCD module
Trend Curve Buffer	0x84	CH_Mode(Byte)+DATA0(Word)+...+DATA _n	<p>Write trend curve buffer.</p> <p>CH_Mode defines the channels of data :</p> <ul style="list-style-type: none"> ➤ Each bit in CH_Mode corresponds to one channel. ➤ CH_Mode. 0 corresponds to channel 0. ➤ Low channel ranges ahead. ➤ E.g.: CH Mode=0x83(10000011B), data format like "CH7+CH1+CH0"

Register is accessed by every byte, variable SRAM and trend curve buffer is accessed by every word.

3.3 Register

Register, 256 bytes, is used for hardware operation and process control.

Register Address	Definition	Length (Byte)	Description	
0x00	Version	1	DGUS version number, BCD code, 0x10 indicates V1.0.	
0x01	LED_NOW	1	LED brightness, 0x00-0x40.	
0x02	BZ_TIME	1	Buzzer beeping time, by every 10ms.	
0x03	PIC_ID	2	Read: read current picture ID. Write: switch to specific picture ID.	
0x05	TP_Flag	1	0x5A: there is update of touching area. Others= no updating. TouchPanel data is no longer updated if user did not clear the flag after data retrieving.	
0x06	TP_Status	1	0x01: first click. 0x03: pressing down. 0x02: uplift pressing. Others: null.	
0x07	TP_Position	4	Coordinate of touching position: X_H:L, Y_H:L.	
0x0B	TPC_Enable	1	0x00: disable the touchPanel. Others: enable the touchPanel. Default setting: 0xFF.	
0x0C-0x0F	Reserve	4	Undefined.	
0x10-0x1A	R0-RA	11	Mapping of SD card config. register, read only.	
0x1F	RTC_COM_ADJ	1	0x5A: RTC data is rewritten through serial port, cleared after RTC auto updating.	
0x20	RTC_NOW	16	YY:MM:DD:WW:HH:MM:SS	
Send serial command to modify current time, e.g.: A5 5A 0A 80 1F 5A 12 10 25 0412 00 01. "04" means Thursday, it can be written as any day you choose.				
0x30-0x3F	Reserve	16	Undefined.	
0x40	En_Lib_OP	1	0x5A: applying writing in font flash memory, clear after operation.	
0x41	Lib_OP_Mode	1	0x50: Transfer data from variable SRAM to font flash memory. 0xA0: Transfer data from font flash memory to variable SRAM.	
0x42	Lib_ID	1	Designate font address for data exchange. Total space are 16MB, font space: 0x40-0x7F, maximum space of every font is 128KW.	
0x43	Lib_Address	3	Designate address in font library for data exchange. Specified the first (word) address for data operation in font storage, 0x00:00:00-0x01:FF:FF.	
0x46	VP	2	Designate variable SRAM addresses for data exchange. Specified the first (word) address for data operation in font storage, 0x00:00-0x6F:FF.	
0x48	OP_Length	2	Length of exchanged data, by word.	
Save 1KW variable data string starting from 0x1000 address into #64 font ID with starting 0x0000 address, send serial command: A5 5A 0C 80 40 5A 50 40 00 00 00 10 00 02 00.				
0x4A	Timer0	2	16-bit software timer, in term of 4ms, auto-decrement to 0.	Maximum error is +/-4ms.
0x4C	Timer1	1	8-bit software timer, in term of 4ms, auto-decrement to 0.	
0x4D	Timer2	1	8-bit software timer, in term of 4ms, auto-decrement to 0.	
0x4E	Timer3	1	8-bit software timer, in term of 4ms, auto-decrement to 0.	
0x4F	Key_code	1	Address of key code for 13 touch control config. file, 0x00: null. Clear after operation executed.	
0x50-0xFF	Reserve	182	Undefined.	

Register is accessed by command 0x80/0x81.

➤ **Variable SRAM**

Variable SRAM, 28K words, is for storing real-time data. Variable SRAM is divided into 28K address, ranging from 0x0000 to 0x6FFF.

Variable SRAM is read and written by word.

Variable SRAM is accessed by command 0x82/0x83.

➤ **Trend Curve Buffer**

Trend curve buffer is for storing real-time trend curve data, supporting 8 trend curves simultaneously. Trend curve buffer is written by word, each dot of trend curve occupies 2 bytes.

Trend curve buffer is accessed by command 0x84, write only.

Beijing DWIN Technology Co., Ltd.